

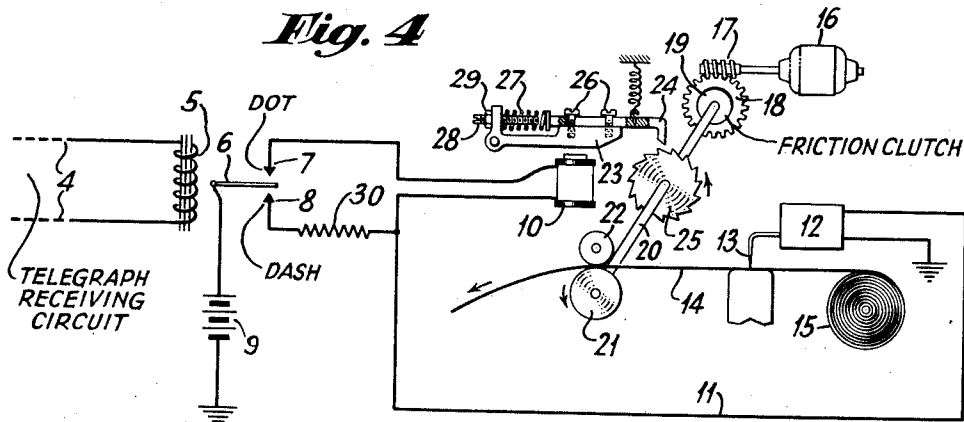
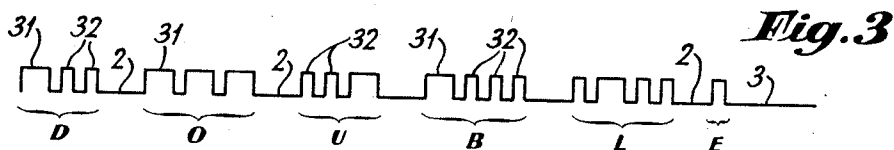
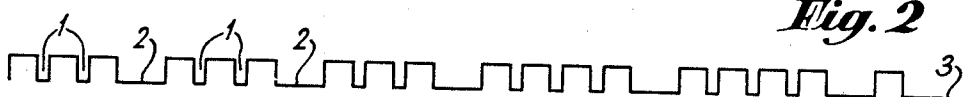
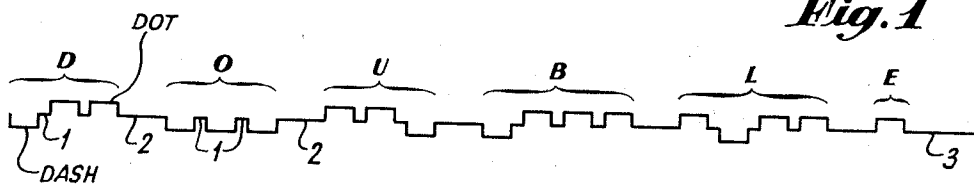
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CABLE-CODE-TO-MORSE-CODE CONVERTER

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CABLE-CODE-TO-MORSE-CODE
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This invention relates to telegraph recorders and particularly to a device for converting three-element code signals such as used in cable telegraphy into Continental Morse code signals as represented by dots and dashes. Cable code signals are usually characterized by dot, dash and space units of equal length, the space units being of neutral polarity whereas the dot signal is of positive polarity and the dash signal of negative polarity. A pen recorder which transcribes the cable code signals on a continuously movable tape usually forms the cable code signals by up and down strokes for dot and dash signals respectively, and draws a line in the neutral position to represent spaces. Receiving telegraph operators who are accustomed to reading a tape of this character sometimes find difficulty in reading tape which is so characterized that the dots and dashes are distinguished only by their length. Conversely, receiving telegraph operators who are familiar only with the recordings of Morse code signals find it difficult to read readily the recordings of double current cable code signals where the dots and dashes are of the same length. Accordingly it is an object of my invention to provide an improved device for converting cable code signals into an ink record similar to that which is used in recording Continental Morse code signals or the like.

It is another object of my invention to provide a code converter which is simple in construction and which distinguishes between dot and dash polarities of the code signals by converting such polarities into markings of different length on the record tape.

Other objects and advantages of my invention will be readily understood from the following description when read in view of the accompanying drawing, in which

Figure 1 shows a representation of characters formed without conversion in respect to the reception of double current cable code signals;

Fig. 2 shows a record tape of the double current code signals when both dots and dashes are represented in like manner, this record being unreadable as shown;

Fig. 3 shows a record tape in which the dot signals are shortened to a normal dot length in comparison with the retention of normal dash length for the dash signals. Such a record is substantially in conformity with a normal Morse code recording; and

Fig. 4 shows a preferred embodiment of my invention in which the essential elements are diagrammatically represented.

In cable code signalling the dot and dash elements occupy the same amount of line time and are distinguished from each other by their polarity or position on the tape of the recorder. Usually the pen moves upwardly to inscribe a dot

element and downwardly to inscribe a dash element. The space elements which separate the letters of a code are usually of the same length as the dot and dash signals. Space signals which separate words, however, are usually of three times the unit length of the letter-separating spaces. In Fig. 1 the cable code combinations necessary for writing the word "double" are shown.

In carrying out my invention I preferably perform two distinct operations for converting the cable code graph on the tape into a Morse code graph. The first step is to invert the dash signals so that both dash and dot pen deflections shall be in the same direction. That is to say, the pen moves upwardly in response to a dash signal as well as in response to a dot signal and upon termination of each signal it drops down to the zero level or base line along which the space signals are delineated. When the code signals are formed at the transmitting end by means of a perforated tape or other automatic transmitting device, it is customary to separate the transmissions of successive dots and dashes by minute space intervals. Such space intervals are shown at 1, for example. A space interval which separates successive letters is shown at 2, while a space interval coming at the end of a word is shown at 3.

It will be seen by reference to Fig. 2 that similar pen deflections are made for both dots and dashes, and this renders the record unreadable, but the inversion of the dash signals is nevertheless desirable in view of the subsequent step to be taken. This step consists in contracting the length of the dot signals by arresting the tape momentarily upon receipt of each dot signal. The result is as shown in Fig. 3. The means for carrying out the two steps of code conversion are shown diagrammatically in Fig. 4, which will now be fully described.

The telegraph receiving circuit 4 includes a relay 5 of conventional type having an armature 6 which normally occupies a neutral position between a dot contact 7 and a dash contact 8. The armature is fed with unidirectional current from a direct current source 9. The dot contact 7 is connected through a magnet 10 to a conductor 11 leading to the electromagnetic responsive device 12, by which the recording pen 13 is controlled. This pen makes an ink record on the tape 14 which is unwound from the blank tape reel 15. A motor 16 having a worm 17 on its shaft drives a worm gear 18 and through this worm gear and a friction clutch 19 a tape feed roller shaft 20 is rotated. The feed roller 21 is rigidly fastened to the shaft 20. An idler 22 presses the tape against the feed roller 21 and normally the tape is drawn past the pen 13 at a constant speed. Upon reception of a dot signal, however, the mag-

net 10 is energized and its armature 23 pulls down an arresting pawl 24 into engagement with a toothed wheel 25 which is also rigidly fastened to the shaft 20. The pawl 24 is mounted on the armature member 23 by means of studs 26, the heads of which have sufficient clearance with the pawl 24 so as not to bind the same. A spring 27 presses against the end of pawl 24 and is compressed slightly when the pawl engages with a tooth in the ratchet wheel 25. The amount of compression of the spring 27 determines the length of the dot signal. This amount of compression can be adjusted by means of a stop consisting of a stud 28 which is threaded into a portion of the armature 23 and fixed in the adjusted position by means of a lock nut 29. The stud 28 acts as a bumper against which the end of the pawl 24 strikes at the moment the ratchet wheel 25 is arrested, thereby momentarily stopping the tape feed while the friction clutch 19 is enabled to slip under the condition of continuous revolution of the worm wheel 18.

When the dot signal is terminated the pawl 24 is released by the de-energization of the magnet 10. The tape feed is, therefore, resumed under driving power of the motor 16.

When a dash signal is received the armature 6 of the relay 5 makes contact with the dash contact 8 and passes current through the resistor 30 having an impedance value which is preferably equivalent to that of the winding in the magnet 10. The dash impulse is, however, transmitted through the conductor 11 to the electromagnetic pen control device 12 and the pen 13 is deflected in the same direction as for a dot signal. In this case, however, the pawl 24 is not actuated and the graph of a dash signal is given its normal length along the tape as shown at 31 in Fig. 3. It will be seen that these dash signals 31 are readily distinguishable from the shortened dot signals shown, for example, at 32.

It is well within the scope of my invention to employ the means shown in Fig. 4 for other code converting purposes, such as may readily occur to those skilled in the art. It will be understood, therefore, that my invention is of such scope as is permitted by the breadth of the claims.

I claim:

1. In a telegraph recorder, relay means responsive to three-element code signals in which dot, dash and space units are differently characterized but are of substantially the same duration, a record tape, a recording pen movable transversely of said tape under control of said relay means, means for causing said pen to be deflected in the same direction from a base line which represents spaces to a position which represents both dots and dashes, means for normally feeding the tape past the pen recording position at a substantially constant rate, and means operable in response to the reception of a dot signal for shortening the delineation of the dot signal lengthwise of said tape.

2. Apparatus in accordance with claim 1 in which the last said means comprises an electromagnetically operable pawl, a ratchet wheel engageable thereby, a motor driven tape feed roll, a drive shaft on which said ratchet wheel and said feed roll are rigidly mounted, and yieldable means for limiting the advancement of the tape while said pawl is engaged with said ratchet wheel.

3. A telegraph recorder having a tape and a pen for inscribing a message thereon, means for drawing the tape lengthwise past the pen, means

for moving the pen transversely of the tape in response to received signals, means for translating plus, minus and neutral signals of substantially equal duration into marking and spacing signals of substantially equal duration, and means responsive to the reception of plus signals only for momentarily arresting the tape, thereby to produce a graph of a marking signal of dot-length as distinct from other marking signals of dash-length.

4. A system for producing record tape whereon dot and dash code signals are delineated as such, comprising relay means selectively settable in accordance with any one of three different signaling conditions, means including a pen and an actuating device therefor, operable by said relay means for marking said tape along a base line during the occurrence of one of said conditions, and along another line during either occurrence of the other two of said conditions, means for normally drawing said tape past the pen at a constant rate, and means operable by said relay means during the occurrence of one only of the other two said conditions for momentarily retarding said tape.

5. The method of producing record tape whereon dot and dash signals are delineated as such, which method comprises receiving code signals the elements of which are of substantially equal length and of three different characteristics, producing a space-signal record on said tape in response to the reception of a code element of one of said characteristics, producing a marking-signal record on said tape in response to the reception of a code element of either of the two remaining characteristics, and retarding the normal rate of tape feed in response to the reception of a code element of one only of said two remaining characteristics.

6. In a device of the character described, the combination which includes a telegraph signal responsive means operable from a neutral position to either of two other positions, a record tape, means including a pen for tracing a line on said tape, means for drawing said tape past said pen at a normally constant speed, means for displacing said pen in one direction under control of said signal responsive means when the latter is moved from said neutral position to either one of its two other positions, and means operative when said signal responsive means is moved to one only of said two other positions for retarding the movement of said tape.

7. A device in accordance with claim 6 in which the last said means includes a tape feed roll, a ratchet wheel rotatable therewith, a magnetically operable pawl engageable with said ratchet wheel, and resilient means for opposing a slight yielding movement of said pawl during its engagement with said ratchet wheel.

8. In a telegraph recorder, relay means responsive to three-element code signals in which dot, dash and space elements are of substantially equal duration, a record tape, a recording pen movable transversely of said tape under control of said relay means, means also under control of said relay means for causing said pen to be deflected from a base line which represents space elements to a line which represents dot and dash elements, means for normally feeding the tape past the recording position at a constant rate, and means responsive to the reception of a dot signal for momentarily arresting the tape feeding means.

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